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# What's Your Radiographic Diagnosis?

Dave Stelling\*  
Sandra McNeel, DVM\*\*

## History

A two-month-old Quarterhorse was presented for evaluation of a severe valgal ('knock-kneed') angulation of the carpi and diarrhea of two to three days' duration. The angular deformity had been present since birth. At one month of age, the foal had experienced pneumonia and a draining tract on the left carpus, but these were not evident on presentation.

## Clinical Exam

The left carpal joint was enlarged and painful. Temperature, pulse, respiration, and gut sounds were normal; hematological data were unremarkable. The tail and legs were stained with watery green feces. Treatment was initiated for diarrhea and pain; two days later, radiographs of the carpi were made.

## Radiographic Findings

Right carpus (Fig. 1): A 35° valgus angulation is present with its pivot point at the level of the radiocarpal articulation. Absence of a portion of the proximal aspect of metacarpal II and a radiolucent defect in the adjacent part of metacarpal III are the most obvious defects. The distal metaphysis of the radius is abnormally flared at its lateral margin. The lateral side of the radial epiphysis is narrowed proximo-distally. All carpal bones are smaller than normal, especially those on the lateral side, indicating abnormally slow ossification.

Left carpus (Fig. 2): A 30° valgus angulation with pivot point at the radial epiphysis is present. A large defect is seen at the lateral aspect of the distal radius. This includes absence of a large portion of the radial epiphysis,

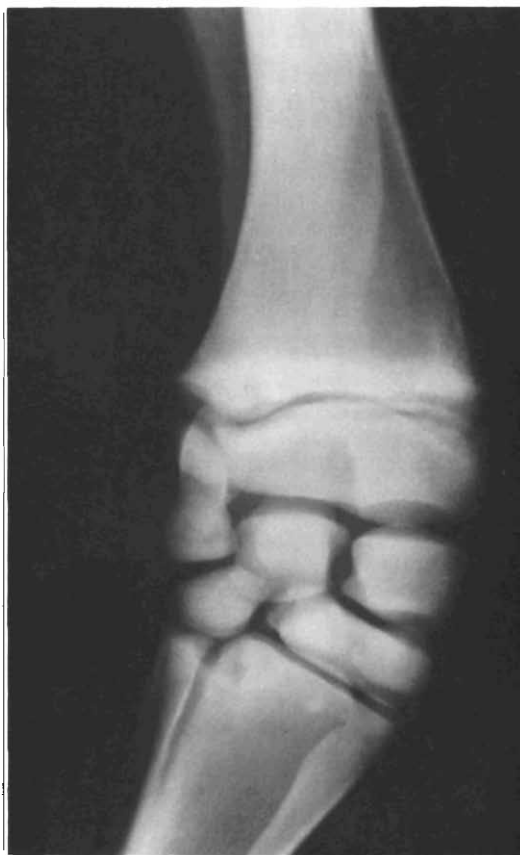


Figure 1. AP view of right carpus.

sis, a radiolucent metaphyseal defect surrounded by a sclerotic rim, abnormal buttressing and flaring of the metaphysis, and a separate focus of bone density at the lateral aspect of the physis. The latter may represent the displaced and partially deossified remnant of the lateral styloid process. The carpal bones are smaller in diameter than those of a normal two-month-old foal, similar to the findings in the right carpus. Soft tissue swelling was noted only in the left carpus.

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### Evaluation and Dispensation

The right carpus shows extensive endochondral ossification defects with skeletal maturity approximating that of a normal one- to two-week-old, with a focal bone defect in metacarpals II and III suggesting osteochondrosis or focal bone necrosis.

The radiographic changes in the distal left radius indicate focal osteomyelitis and/or bone abscessation and necrosis, with or without an underlying ossification defect. This is compatible with the soft tissue swelling



**Figure 2. AP view of left carpus.**

and the history of a draining tract.

Based on these findings, a poor prognosis was given for correction of the deformity, and the owner elected to have the foal euthanized.

Necropsy and histopathology of the carpi, lungs, and intestines yielded diagnoses of a septic polyarthritis (*E. coli* isolated), chronic

active and fibrosing osteomyelitis and fibrinopurulent synovitis (left carpus), multifocal resolving pneumonia, and ulcerative colitis (Group B *Salmonella* isolated).\*

### Discussion

Varus and valgus limb deformities of the carpi and tarsi have been classified into five etiological categories: 1) joint laxity due to immature periarticular supporting tissues; imbalanced bone growth at the level of the metaphysis (2) or epiphysis (3) of the radius or tibia; 4) ossification defects of the carpal or tarsal bones; 5) direct external trauma to the carpi or tarsi.<sup>1</sup>

The first four etiologies are consistent with a history of angular deformity since birth. It is common for more than one etiology to be present in a single patient, and in this case the following signs support a multifactorial cause for the carpal lesions.

Most prominently, a primary imbalance of growth at the metaphysis (metaphyseal flaring, especially in the left carpus) or at the epiphysis (proximo-distal narrowing of the lateral side of the epiphysis seen in the right carpus) are indicated. The hypoplastic morphology of the carpal bones may indicate primary defects in ossification or ossification defects secondary to joint laxity.

The large radiolucent defects in the epiphysis and metaphysis indicate complicating factors of septic polyarthritis and bony abscessation in addition to the developmental abnormalities of the carpi. One may speculate that the reported pneumonia resulted in an embolic shower, with septic thrombi lodging in the rich vasculature common to areas of rapidly growing bone. The resulting abscessation and bone lysis would lead to further exaggeration of the limb deformities and an even poorer prognosis.

Surgical methods (transphyseal bridging) have not been able to correct angular deviations greater than 25°, and these procedures must be done before the age of 60 to 80 days (optimally, 14 to 30 days) to have any effect at all.<sup>1</sup> Considering this foal's deviations of 30° and 35°, its age of two months, and the lytic changes present, no favorable prognosis could have been given.

### REFERENCE

1. Fretz, P: Angular Limb Deformities in Foals, in Moyer, W (ed): *The Veterinary Clinics of North America: Large Animal Practice*, 2(1):125-150, 1980.

\*Pathological examination and diagnosis by Dr. Ron Myers and Dr. David Morfitt, both of the Department of Veterinary Pathology at Iowa State University.